

# AVIATION AND AERONAUTICAL ENGINEERING



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VOLUME III  
Number 9

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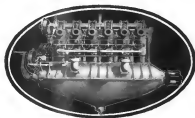


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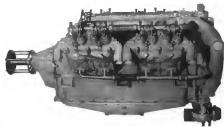




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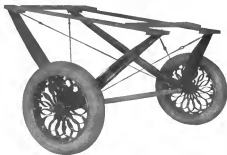
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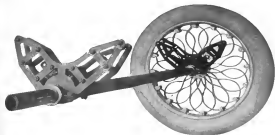
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# AVIATION AND AERONAUTICAL ENGINEERING

VOL. III. NO. 9

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Vol. III

December 1, 1917

No. 9

## Aircrew Analysis

By A. F. Zahm

### Introduction

Significance is conferred on many of the results of an aircrew analysis to make, (1) an acceleration analysis, (2) a stress analysis, the first to determine the performance, the second the structural safety.

For reference, the total air stress is given by the analysis:

$$\begin{aligned} \sigma &= \sqrt{a^2 + v^2} \\ \sigma &= \sqrt{a^2 + v^2} \\ \sigma &= \sqrt{a^2 + v^2} \end{aligned} \quad (1)$$

where  $\sigma$  is the total stress,  $a$  the acceleration,  $v$  the velocity.

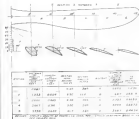


FIG. 1.—Diagram of a Propeller Blade.

From data for a propeller blade—most aerodynamic control of air at low speeds is exerted by a blade having a curved leading edge. The blade is curved so that the air is deflected away from the blade. The blade is curved so that the air is deflected away from the blade. The blade is curved so that the air is deflected away from the blade.

### Aerodynamic Analysis

Velocity and Torque of Propeller Blade—Each point of an aircrew blade describes a helical path whose pitch is constant when the speed of rotation and revolutions per second are constant. The path is usually referred to as the helical path. The path is usually referred to as the helical path. The path is usually referred to as the helical path.

The helical path is usually referred to as the helical path. The helical path is usually referred to as the helical path. The helical path is usually referred to as the helical path.

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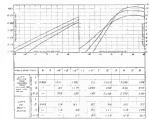


FIG. 2.—Diagram of a Propeller Blade.

total velocity of the moving point and  $\theta$  the blade angle at  $r$ .

The total air force at any section with speed  $V$ , may be found in magnitude as follows:

$$F = K A V^2 \quad (2)$$

in which  $K$  is the density,  $A$  is the area,  $F$  the force per unit section, at any speed for an aircrew having the same air resistance at any section and moving in air of same density. The direction of  $F$  in terms of the aircrew is constantly known from aerodynamic experiments. Otherwise the lift and drag are computed, and then the resultant force. The lift lift is  $L = F \sin \theta$ , the drag is  $D = F \cos \theta$ , from the "pitching angle" or direction of  $F$  referred to the lift  $L$ . If  $F$  is in units per foot the lift and drag are square foot per foot, 0.00307, and 0.00307, respectively.

Thrust and Torque, Thrust Power and Torque Power—The resultant component  $L$  of the air force at any  $r$  is the resultant, the perpendicular component  $L$  multiplied by the section radius is the resultant. Multiplying these units by the blade width gives the thrust and torque per unit length of blade, as tabulated and plotted in Fig. 4, and integrating absolutely gives the whole thrust and whole torque for the blade. From these are derived the thrust power and torque power, as multi-

plied by the absolute lift and drag coefficients in the components of  $K$  taken respectively with and above the section and



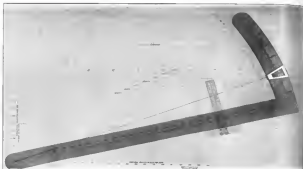


FIG. 11—PROCESSED CURVES

FIG. 11 shows a set of curves, the first two coordinate elements,  $x$  and  $y$ , taken up, respectively, to the radial line and the thread or gliding line. (1)  $x$  is the  $x$  of Fig. 10, the exact percentage efficiency.

Next the black curve line of a triangular  $1$  square is laid over the velocity point  $b$ , and square across the radial line, and across the gliding line at the "thrust point"  $c$ , whose abscissa is the "thrust factor," Equation (1) + (2).

All the numerical values thus far read from the instrument, together with some given properties and dimensions of the blade sections, are entered at a row, as in Fig. 8. Under these are inserted the readings for other blade sections. Columns  $a$ ,  $b$ ,  $c$ , and  $d$ , are now multiplied together giving the last column. The entire work of taking and entering the readings occupies less than ten minutes.

A practical form of the instrument, as exhibited in Fig. 10, comprises: (1) a sheet of ordinary section paper on a draw-

ing board, (2) a rectangular transparent slide,  $3\frac{1}{2}$  inches long, placed at the origin, the other corner to a convenient, small, collimated light source, so that along the straight length of the ruler, looking on the ruler is a fine thread passing on the point to an aluminum scale which gives freely, along it, an  $x$  value, treatment of the theory, and operation of the instrument is given by W. P. Love in the *Journal of the Institution of Engineers*, for December, 1917.

*Form of Comparison.* The air flow on a small channel, a propeller may be written:

$$M = \rho \pi R^2 V D$$

in which  $\rho$  is the density of air,  $V$  its velocity. For each series of fixed shape having a forward velocity  $V$ , at a point constant while the diameter  $D$  and angular speed  $\omega$ , vary,

$$M = \rho \pi R^2 \omega^2 V D$$

now,  $1/\omega^2$ ,  $1/\omega$ ,  $1/\omega^2 V D$ , and  $1/\omega$  are functions of  $1/V D$ . Fourth axial and tangential components of  $R$  are similarly expressed their summation, or the whole thrust and torque may be written:

$$\text{Thrust, } T = \rho \pi V D^2 C_1 (1/V D)$$

$$\text{Torque, } Q = \rho \pi V D^2 C_2 (1/V D)$$

From these follow at once:

$$\text{Thrust power} = T V = \rho \pi V^2 D^2 C_1 A D$$

$$\text{Torque power} = \omega Q = \rho \pi V D^2 C_2 D$$

$$1.25 \times 10^{-5} = T V / \rho \pi V^2 D^2 C_1 A D$$

These five equations, treated in a table form of comparison, between geometrical, weight properties. For example  $d$  is such as to be above at any diameter  $1/2 D$  or more when diameters are respectively  $1/2$  and  $1/4$ , the at thrust are thus related:

$$T_1/T_2 = \rho \pi V^2 D^2 C_1 A D$$

$$\text{when } d = 1/2 \text{ then } V D^2 C_1 A D = 1/2^2 \times 1/2 D$$

If diameter  $d$ , be observed, or given, for one series of diameter  $d$ , the thrust  $T_1$  of any series, of diameter  $d$ , using with the same  $1/2 D$ , is found by simple multiplication similarly for the torque, etc. Thus it appears that the propeller may have treated directly the characteristics of a propeller across, and, by comparison, those of practically similar series.

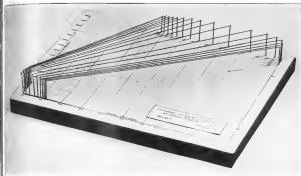


FIG. 12—THE AIR SOURCE

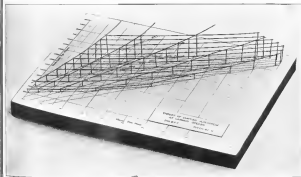


FIG. 13—THE AIR SOURCE

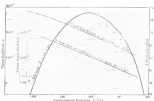


FIG. 10—Map of Processes Comparison.







## The 160 HP. Benz and Mercedes Aircraft Engines Compared\*

The 180 hp. Benz and the 160 hp. Mercedes engines are, at the present moment, thoroughly representative of current German practice in aircraft engine design, which is emphasized by the fact that nearly all of the enemy airplanes that have been captured by the Allies were found to be equipped with

either Breg or Morchilla engines. A detailed analysis and estimated comparison of these two engines, which have been authorized by the British naval and military authorities, therefore, of treaty interest.

Taken as a whole, the Boer and the Maro'dis have an

Figure 1

[illegible]

TABLE 1c  
 1986-1987, 1988-1989, 1990-1991

Pumping, valve gear and auxiliaries  
 Fuel Pumping Unit  
 Piston Rods  
 Total Losses  
 Brake mean pressure  
 Crankshaft induction mass pressure  
 Crankshaft mechanical efficiency

TABLE III  
Flow Characteristics of the Polymers

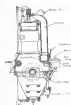
[illegible]

Figure 1. Schematic diagram of the experimental setup.

Vertical distance from	0.000	—
Horizontal distance to	0.000	1.000
Index point	0.000	0.000
Vertical point	0.000	0.000
Horizontal point	0.000	0.000

\* Taken from *The Automobile Register*.

14th IUP. David Claessens et al.



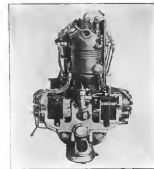
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characteristics in common, and differ from one another only in minor details of design. Both engines bear out plainly the German practice of sacrificing light weight to sturdiness, and consequently, reliability. Both are of the water-cooled, air-cooled, vertical type, with overhead camshaft drive, and possess double exhaust and twin carburetors, and, finally, the structural parts of both engines appear to have been designed with the particular view of quantity

Details of design which are at variance from one another may be listed as follows. The overhead shaft arrangement of the Benz appears as less convenient to that of the

TABLE VI  
 Values of  $\alpha$ [illegible]

\*This table is not intended to be used as a comprehensive list.



Exp. View as 160 HP. Best Engine

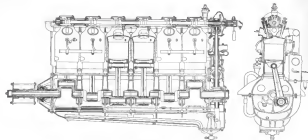
TABLE 6  
1986-87 Gross Calves

Species	Length	Wing	Tail	Culmen	Weight
1. House sparrow	130	75	55	40	15
2. Starling	140	80	60	45	20
3. Goldfinch	120	70	50	35	12
4. Chaffinch	135	78	58	42	18
5. Robin	145	85	65	50	25
6. Pigeon	160	95	75	60	35
7. Dove	150	90	70	55	30
8. Thrush	135	80	60	45	20
9. Wren	125	72	52	38	14
10. Sparrow	130	75	55	40	15

†Fitted generalized likelihood estimates of  $\beta$  and  $\gamma$  are not necessarily unique due to  $\beta$  being on the boundary.

	100-HR
Overall height of leaves at similar leaves top of leaves (cm)	1.0-1.5
Depth of deepest part of leaf (cm)	0.5-1.0
Number of divisions of lamina from base to petiole	2-3
Leaf width (cm)	0.5-1.0
Leaf thickness (mm)	0.5-1.0
Leaf color (green, yellow, brown, red)	Green
Leaf shape (linear, lanceolate, ovate, elliptical, etc.)	Linear
Leaf base (sessile, petiole, etc.)	Sessile
Leaf margin (smooth, serrate, etc.)	Smooth
Leaf venation (pinnate, palmate, etc.)	Pinnate
Leaf texture (smooth, rough, etc.)	Smooth
Leaf odor (sweet, salty, etc.)	Salty
Leaf taste (sweet, salty, etc.)	Salty
Leaf smell (sweet, salty, etc.)	Salty
Leaf color (green, yellow, brown, red)	Green
Leaf shape (linear, lanceolate, ovate, elliptical, etc.)	Linear
Leaf base (sessile, petiole, etc.)	Sessile
Leaf margin (smooth, serrate, etc.)	Smooth
Leaf venation (pinnate, palmate, etc.)	Pinnate
Leaf texture (smooth, rough, etc.)	Smooth
Leaf odor (sweet, salty, etc.)	Salty
Leaf taste (sweet, salty, etc.)	Salty
Leaf smell (sweet, salty, etc.)	Salty

<sup>a</sup>Significant pairwise group differences ( $p < 0.05$ ) are indicated.



GENERAL ARRANGEMENT OF DAIMLER-BENZ 100 HP. DUAL &amp; 100 HP. ENGINE



DIAGRAM OF INTAKE AND EXHAUST PORTS, 100 HP. DUAL ENGINE

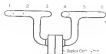
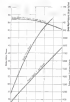


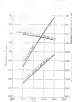
DIAGRAM OF INTAKE AND EXHAUST PORTS, 100 HP. MANIFOLD ENGINE



DUAL AND EXHAUST VALVE OF 100 HP. DUAL ENGINE



POWER CURVE OF 100 HP. DUAL ENGINE



POWER CURVE OF 100 HP. MANIFOLD ENGINE



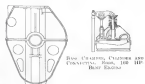
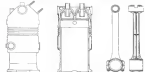
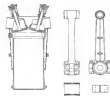
TOP VIEW OF 100 HP. DUAL ENGINE

Motors, because it may be more easily manufactured, and is also more available, although, on the other hand, the Mercedes valve gear is the better arrangement for a high-speed engine. Particularly, greater rigidity is imparted to the arrangement by the Mercedes design, the cylinders being connected in another by the manifold housing.

The Dual cylinder is one of cast iron with built-up water jackets, the pistons being in both types about steel passages welded to the cylinder heads. The pistons of the Dual are of cast iron, while those of the Mercedes are of the built-up type, comprising a forged steel head, with a cooling-wall screw and welded to it.

The water pump arrangement of the Dual is particularly worthy of note in that it is reduced to a minimum and can easily be adapted.

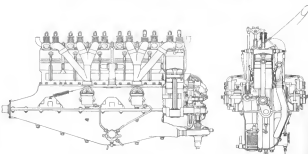
In the accompanying disconnected comparison it has been necessary, owing to the differences in the design of the valve



ROCK CRANKS, CRANKS AND CONNECTING RODS, 100 HP. DUAL ENGINE



ROCK CRANKS, CRANKS AND CONNECTING RODS, 100 HP. MANIFOLD ENGINE



GENERAL ARRANGEMENT OF DUAL ENGINE, 100 HP. DUAL &amp; 100 HP. ENGINE

TABLE VII  
Conductivity Data and Factors[illegible]

Downloaded from <http://ajphaphysiol.physiology.org/> at University of California, San Diego on September 11, 2015

[illegible]4-day T<sub>1/2</sub> is 13–14 days in case of underdosed sample pairs and normal 4-day T<sub>1/2</sub> was observed only in 1 out of 5000 cultures (0.02%).

100 HP. Mercedes-Benz Power and Glamour. Pro



160 HP Benz Piston and Gasket Pos



## You Have Customers



101 101. West, Thomas and Corinne. 1990. Bay Area.

TABLE 3  
DEVELOPMENTAL TRENDS[illegible]TABLE No.  
FUNDING ALLOCATION BY REGION

		1980-81		1981-82		1982-83		1983-84	
		No.	Percentage of Total Workers	No.	Percentage of Total Workers	No.	Percentage of Total Workers	No.	Percentage of Total Workers
Category	Description								
Male	Top level	100	100	100	100	100	100	100	100
Female	Top level	100	100	100	100	100	100	100	100
Male	Second level	100	100	100	100	100	100	100	100
Female	Second level	100	100	100	100	100	100	100	100
Male	Third level	100	100	100	100	100	100	100	100
Female	Third level	100	100	100	100	100	100	100	100
Male	Fourth level	100	100	100	100	100	100	100	100
Female	Fourth level	100	100	100	100	100	100	100	100
Male	Fifth level	100	100	100	100	100	100	100	100
Female	Fifth level	100	100	100	100	100	100	100	100
Male	Sixth level	100	100	100	100	100	100	100	100
Female	Sixth level	100	100	100	100	100	100	100	100
Male	Seventh level	100	100	100	100	100	100	100	100
Female	Seventh level	100	100	100	100	100	100	100	100
Male	Eighth level	100	100	100	100	100	100	100	100
Female	Eighth level	100	100	100	100	100	100	100	100
Male	Ninth level	100	100	100	100	100	100	100	100
Female	Ninth level	100	100	100	100	100	100	100	100
Male	Tenth level	100	100	100	100	100	100	100	100
Female	Tenth level	100	100	100	100	100	100	100	100
Male	Eleventh level	100	100	100	100	100	100	100	100
Female	Eleventh level	100	100	100	100	100	100	100	100
Male	Twelfth level	100	100	100	100	100	100	100	100
Female	Twelfth level	100	100	100	100	100	100	100	100
Male	Thirteenth level	100	100	100	100	100	100	100	100
Female	Thirteenth level	100	100	100	100	100	100	100	100
Male	Fourteenth level	100	100	100	100	100	100	100	100
Female	Fourteenth level	100	100	100	100	100	100	100	100
Male	Fifteenth level	100	100	100	100	100	100	100	100
Female	Fifteenth level	100	100	100	100	100	100	100	100
Male	Sixteenth level	100	100	100	100	100	100	100	100
Female	Sixteenth level	100	100	100	100	100	100	100	100
Male	Seventeenth level	100	100	100	100	100	100	100	100
Female	Seventeenth level	100	100	100	100	100	100	100	100
Male	Eighteenth level	100	100	100	100	100	100	100	100
Female	Eighteenth level	100	100	100	100	100	100	100	100
Male	Nineteenth level	100	100	100	100	100	100	100	100
Female	Nineteenth level	100	100	100	100	100	100	100	100
Male	Twentieth level	100	100	100	100	100	100	100	100
Female	Twentieth level	100	100	100	100	100	100	100	100
Male	Twenty-first level	100	100	100	100	100	100	100	100
Female	Twenty-first level	100	100	100	100	100	100	100	100
Male	Twenty-second level	100	100	100	100	100	100	100	100
Female	Twenty-second level	100	100	100	100	100	100	100	100
Male	Twenty-third level	100	100	100	100	100	100	100	100
Female	Twenty-third level	100	100	100	100	100	100	100	100
Male	Twenty-fourth level	100	100	100	100	100	100	100	100
Female	Twenty-fourth level	100	100	100	100	100	100	100	100
Male	Twenty-fifth level	100	100	100	100	100	100	100	100
Female	Twenty-fifth level	100	100	100	100	100	100	100	100
Male	Twenty-sixth level	100	100	100	100	100	100	100	100
Female	Twenty-sixth level	100	100	100	100	100	100	100	100
Male	Twenty-seventh level	100	100	100	100	100	100	100	100
Female	Twenty-seventh level	100	100	100	100	100	100	100	100
Male	Twenty-eighth level	100	100	100	100	100	100	100	100
Female	Twenty-eighth level	100	100	100	100	100	100	100	100
Male	Twenty-ninth level	100	100	100	100	100	100	100	100
Female	Twenty-ninth level	100	100	100	100	100	100	100	100
Male	Thirtieth level	100	100	100	100	100	100	100	100
Female	Thirtieth level	100	100	100	100	100	100	100	100
Male	Thirty-first level	100	100	100	100	100	100	100	100
Female	Thirty-first level	100	100	100	100	100	100	100	100
Male	Thirty-second level	100	100	100	100	100	100	100	100
Female	Thirty-second level	100	100	100	100	100	100	100	100
Male	Thirty-third level	100	100	100	100	100	100	100	100
Female	Thirty-third level	100	100	100	100	100	100	100	100
Male	Thirty-fourth level	100	100	100	100	100	100	100	100
Female	Thirty-fourth level	100	100	100	100	100	100	100	100
Male	Thirty-fifth level	100	100	100	100	100	100	100	100
Female	Thirty-fifth level	100	100	100	100	100	100	100	100
Male	Thirty-sixth level	100	100	100	100	100	100	100	100
Female	Thirty-sixth level	100	100	100	100	100	100	100	100
Male	Thirty-seventh level	100	100	100	100	100	100	100	100
Female	Thirty-seventh level	100	100	100	100	100	100	100	100
Male	Thirty-eighth level	100	100	100	100	100	100	100	100
Female	Thirty-eighth level	100	100	100	100	100	100	100	100
Male	Thirty-ninth level	100	100	100	100	100	100	100	100
Female	Thirty-ninth level	100	100	100	100	100	100	100	100
Male	Fortieth level	100	100	100	100	100	100	100	100
Female	Fortieth level	100	100	100	100	100	100	100	100
Male	Forty-first level	100	100	100	100	100	100	100	100
Female	Forty-first level	100	100	100	100	100	100	100	100
Male	Forty-second level	100	100	100	100	100	100	100	100
Female	Forty-second level	100	100	100	100	100	100	100	100
Male	Forty-third level	100	100	100	100	100	100	100	100
Female	Forty-third level	100	100	100	100	100	100	100	100
Male	Forty-fourth level	100	100	100	100	100	100	100	100
Female	Forty-fourth level	100	100	100	100	100	100	100	100
Male	Forty-fifth level	100	100	100	100	100	100	100	100
Female	Forty-fifth level	100	100	100	100	100	100	100	100
Male	Forty-sixth level	100	100	100	100	100	100	100	100
Female	Forty-sixth level	100	100	100	100	100	100	100	100
Male	Forty-seventh level	100	100	100	100	100	100	100	100
Female	Forty-seventh level	100	100	100	100	100	100	100	100
Male	Forty-eighth level	100	100	100	100	100	100	100	100
Female	Forty-eighth level	100	100	100	100	100	100	100	100
Male	Forty-ninth level	100	100	100	100	100	100	100	100
Female	Forty-ninth level	100	100	100	100	100	100	100	100
Male	Fiftieth level	100	100	100	100	100	100	100	100
Female	Fiftieth level	100	100	100	100	100	100	100	100
Male	Fifty-first level	100	100	100	100	100	100	100	100
Female	Fifty-first level	100	100	100	100	100	100	100	100
Male	Fifty-second level	100	100	100	100	100	100	100	100
Female	Fifty-second level	100	100	100	100	100	100	100	100
Male	Fifty-third level	100	100	100	100	100	100	100	100
Female	Fifty-third level	100	100	100	100	100	100	100	100
Male	Fifty-fourth level	100	100	100	100	100	100	100	100
Female	Fifty-fourth level	100	100	100	100	100	100	100	100
Male	Fifty-fifth level	100	100	100	100	100	100	100	100
Female	Fifty-fifth level	100	100	100	100	100	100	100	100
Male	Fifty-sixth level	100	100	100	100	100	100	100	100
Female	Fifty-sixth level	100	100	100	100	100	100	100	100
Male	Fifty-seventh level	100	100	100	100	100	100	100	100
Female	Fifty-seventh level	100	100	100	100	100	100	100	100
Male	Fifty-eighth level	100	100	100	100	100	100	100	100
Female	Fifty-eighth level	100	100	100	100	100	100	100	100
Male	Fifty-ninth level	100	100	100	100	100	100	100	100
Female	Fifty-ninth level	100	100	100	100	100	100	100	100
Male	Sixtieth level	100	100	100	100	100	100	100	100
Female	Sixtieth level	100	100	100	100	100	100	100	100
Male	Sixty-first level	100	100	100	100	100	100	100	100
Female	Sixty-first level	100	100	100	100	100	100	100	100
Male	Sixty-second level	100	100	100	100	100	100	100	100
Female	Sixty-second level	100	100	100	100	100	100	100	100
Male	Sixty-third level	100	100	100	100	100	100	100	100
Female	Sixty-third level	100	100	100	100	100	100	100	100
Male	Sixty-fourth level	100	100	100	100	100	100	100	100
Female	Sixty-fourth level	100	100	100	100	100	100	100	100
Male	Sixty-fifth level	100	100	100	100	100	100	100	100
Female	Sixty-fifth level	100	100	100	100	100	100	100	100
Male	Sixty-sixth level	100	100	100	100	100	100	100	100
Female	Sixty-sixth level	100	100	100	100	100	100	100	100
Male	Sixty-seventh level	100	100	100	100	100	100	100	100
Female	Sixty-seventh level	100	100	100	100	100	100	100	100
Male	Sixty-eighth level	100	100	100	100	100	100	100	100
Female	Sixty-eighth level	100	100	100	100	100	100	100	100
Male	Sixty-ninth level	100	100	100	100	100	100	100	100
Female	Sixty-ninth level	100	100	100	100	100	100	100	100
Male	Seventieth level	100	100	100	100	100	100	100	100
Female	Seventieth level	100	100	100	100	100	100	100	100
Male	Seventy-first level	100	100	100	100	100	100	100	100
Female	Seventy-first level	100	100	100	100	100	100	100	100
Male	Seventy-second level	100	100	100	100	100	100	100	100
Female	Seventy-second level	100	100	100	100	100	100	100	100
Male	Seventy-third level	100	100	100	100	100	100	100	100
Female	Seventy-third level	100	100	100	100	100	100	100	100
Male	Seventy-fourth level	100	100	100	100	100	100	100	100
Female	Seventy-fourth level	100	100						

## Aeronautical Patents

[illegible]





### How to Prepare for Overseas Service

An Aero officer who on foreign duty has written a letter home suggesting that each soldier should be decked out before embarking and listing the more important items which should be carried along:

His first suggestion is to settle one's business affairs. Full knowledge of one's financial situation should be filed for the Soldiers' and Sailors' Exchanges, the study of French begins, and a checking account with an American bank established. A cash advance should also be taken before leaving the country, and all equipment should be carefully and completely packed. A total of 250 lb may be carried by officers.

In view of the prices of equipment abroad, it is advisable to secure certain things before undertaking a trip overseas. Leather, among other things, is expensive abroad, but, strange to relate, he states that the "Sim Breeze" belts are only 15 cent off in Paris. The best "French" boots in England and France, however, are imported at cost \$25, while synthetic shoes with cow-skin leathers average 40. In general, a dollar in United States money represents 5.70 francs, or 4 shillings in pounds. Polishk American troops will be paid in French francs.

To note, continues the voyager, eggs are expensive, though not so much over there, in fact, only champagne hats and steel helmets are authorized. Patents are kept much closer and water if found for the trip.

A list of the officer's suggestions as to equipment follows: Officers' locker or trunk (wooden drawers) is best; it is light and strong, with toilet articles, inside drawers, wrist watch, pocket flash light, dent, wheel and rubber lighter, stained socks, light slacks, and labors for two months, a short winter coat, non-skid waterproof boots, band and shoe laces, downland gloves, extra hat, shoes and socks with, plenty of handkerchiefs and socks, a cable code book, coffee (not in glass), chocolate, soap and beef tablets or a few cans of soup, few and handy maps, a few books, plenty of United States money, a good fountain pen, blank forms and stationary and a wash basin.

### Lord Northcliffe on Aircraft Production

In an interview Lord Northcliffe says he will return to the United States at the end of the British War Mission after the Allied conference and trip to France.

If the British Government desired, he said that he would devote much of his time to the question of aircraft production in the United States, and added:

"My great fear is that the American output will exceed the possibilities of training officers and mechanics. Americans are willing to make any type of engine we wish, in addition to their own Liberty engine."

### Assigned to Joint Technical Board

Cvt. H. H. Bond and Maj. Harold S. Martin, Signal Corps, have been appointed members of the Joint Army and Navy Technical Aircraft Board, in place of Brig. Gen. R. D. Foshier and Maj. Henry W. Harnes, Signal Corps.

### New German Rubber Boot

Recent dispatches from the fighting front tell of a new rubber boot having been issued by German troops. The boots are covered with a rubber base of leather, rubber and rope, which makes them bound against into the air after striking the ground. The special issue attracted causes the boots to hard when it has reached the ground of the boots, about as fast as the air.

Bands of these aerial boots, which have been pinned up, show that all are provided with a base of synthetic rubber and are wrapped around and around with rope, making them unbreakable.

The boots are weighed so that the end with the rubber pad will sink to the ground first. The impact with the earth acts in turn, the same force, which detaches the boots a fraction of an second later when the boots have bounced into the air.

### Air Mail for U. S. Troops

Aerial postal service between the American troops in France and their British and French comrades, with an extension to Algeria and Morocco, is planned in the nearest post authorities at La Harne.

A commission has been appointed to study the question of mails and sailing routes for the service.

### Swear Allegiance at Standard Plants

Men and women employed by the Standard Aero Corp. and the South of America in the United States recently

Swore that the custom they and other industries are committed by money alone constitute a deadly peril to the country's war preparations. Harry Dowson, manager, president of the corporation, and members of the board of directors, and representatives of over one of his departments of employees, and then ordered that every man and woman of this should take the oath of allegiance. The oath was administered by a public official, largely, empowered to do so, in the factory and associates, as well as the factory employees.

The Standard Aero Corp. has just moved a unique plant at the help and machinery to the new plant at Elizabeth, N. J. In addition to the original plant which existed at the time the purchase was made of the original property from the Standard Aero Works, a new two-story aircraft assembly building has been just up, running the length of the shop barns for the new have been built, ready to hold two hundred and fifty cars, each separately in a room provided with shower baths, etc.

These new construction on administration building which will be completed within a month and which will house of administrative help and continue the principal executive office, as within a month the immense enterprise and have room of its employees will be running, where all the employees will be from the company's kitchen.

Concurrent with the moving of the main portion of the operation from Elizabeth, the Standard Aero Corp. has found it necessary to organize an additional company under the name of the Standard Aircraft Corp. under the laws of the State of New York.

The and after Nov. 1, 1917, these two organizations, independently the same management, but with their enlarged facilities and reinforced energy, will divide their activities in the field.

The Standard Aero Corp. of New York, according to this both, with centers on engineering and experimental organization, doing primarily aircraft engineering and experimental work, while the Standard Aircraft Corp. will be in production or manufacturing company, operating at the plant field and Elizabeth plants.

A number of changes in personnel have taken place with its organization, which are as follows:

Clifford Talbot, formerly superintendent of the New England Westinghouse, has taken charge as works manager of the plants.

R. E. Peckwith, formerly superintendent of the Standard Aero Corp., becomes general manager, and C. V. Bantley, formerly general manager, becomes vice president.

The inauguration and main address of the company will be at Elizabeth. The company expects to push to the utmost its work by employing women help as one of the best means of expediting aircraft production.

### Air Munster for Great Britain

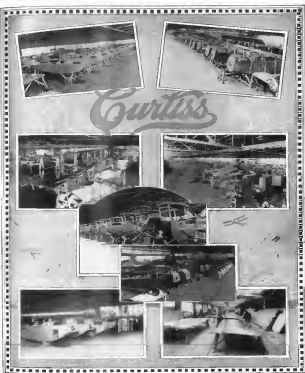
It is reported that a bill for the establishment of an air munster will be introduced in the British House of Commons in a few days. It will provide for recognition of several branches of the work of the naval and military air services and the air board. The ministry will assume complete control of the new air munster.

A central organization policy and a central organization supply will be established. This known will be price paid every day and night and pay. Lord Northcliffe was offered the position at first air munster, but declined. His young brother, Lord Rotherham, then accepted the post. Lord Rotherham is the chief proprietor of the Daily Mirror and Mail of Glasgow and of the Leeds Mercury.

### Sweden to England Via the Air

An airmail passenger and mail service between Sweden, Finland and England has been projected at Stockholm, Sweden according to a special report received by the Department of Commerce, Washington, D. C.

A Swedish company has been incorporated with a capital of \$100,000. It is expected to operate this line, and it is reported that airplanes designed to carry six passengers and a large amount of mail are under construction.



THE CURTIS AMMUNITION COMPANY, JEFFERSON, N. Y.  
Various types of aircraft, including the Curtiss, are shown in the foreground.



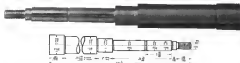
"SOMEWHERE IN THE ROGERS SHOPS" where thousands of wood parts for use in Airplane Construction are handled every day.



Lower Cuts show two methods of Measuring a Wing Rib Cap Strip, the old Two Foot Rule way and the modern Rogers way of Measuring with a Rogers Fig. 13 Double Ended Vernier Gauge ground accurate to .0001 of an inch with a tolerance limit of plus or minus  $1/64"$ , which is the accuracy called for on this particular job.

*Rogers Accuracy Has Been the Foundation of Rogers Success*

**ROGERS CONSTRUCTION COMPANY, AIRCRAFT PARTS  
THE JOHN M. ROGERS WORKS, MEASURING APPLIANCES  
GLOUCESTER CITY, NEW JERSEY**



## Three Times as Many Shafts per Day on the No. 4 Universal Turret Screw Machine

Henceforth the best time recorded for machining this pinion shaft on a turret lathe without a carriage has been 30 minutes each or 20 per day.

But when transferred to the No. 4 with its instantly changeable simultaneous turret-and-carriage operation the time was reduced to 10 minutes each or 60 per day.

Such advancements are common occurrences when any W. & S. machines are in use. On the S-A Hollow Hexagon Turret Lathe former two engine cylinders—previously a 25-hour job—have been produced in 2 hours and 40 minutes from 40 lb. forgings. Again on the S-A 2 1/2" x 10" column planer previously made on engine lathes at the rate of 2 per day were made in 20 minutes each. On the S-A 3 1/2" x 17" lathe that does a job they said was impossible on a turret lathe—was made in 30 minutes against its previous time of 2 hours on an engine lathe. Hundreds of other time-saving instances await the inquiry of those concerned in their own emergency demands for record-breaking speed production.

Because of their close working and extraordinary accuracy no less than their unprecedented speed all W. & S. machines are unquestionably the most economical installation for airplane plants.

Inspection will be promptly answered, by mail or in person, of all sets and drawings with quick and detailed answers in our standard office.



Stocks in 1/2", 3/4" and 1" diameters are being turned and threaded by the turret method. Also 1/2", 3/4" and 1" diameters are being turned by the turret method in the lathe.

**THE  
WARNER  
& SWASEY  
COMPANY  
CLEVELAND, OHIO,  
U. S. A.**

**TURRET LATHES—TURRET  
SCREW MACHINES—  
RACE WORKING  
MACHINE TOOLS**

**NEW YORK Office—Rogers Way  
Detroit Office—Rogers Way  
Boston Office—Rogers Way  
Chicago Office—Rogers Way  
Cleveland Office—Rogers Way  
Los Angeles Office—Rogers Way**

**PHILADELPHIA Office—Rogers Way  
Pittsburgh Office—Rogers Way  
St. Louis Office—Rogers Way  
Washington Office—Rogers Way  
New York Office—Rogers Way  
Detroit Office—Rogers Way  
Boston Office—Rogers Way  
Chicago Office—Rogers Way  
Cleveland Office—Rogers Way  
Los Angeles Office—Rogers Way**





An Austin Standard Factory-Building in Chicago, built in 30 working-days, and ready for occupancy in 30 working-days.

## Austin Standard Factory-Buildings Can be Occupied in 30 Working-days



On April 20, 1917, the Austin Standard Company, subject to the building of 100 working-days, delivered to the Navy Department a building of 100 working-days.



Building No. 10, built in 30 working-days, and ready for occupancy in 30 working-days.



Building No. 10, built in 30 working-days, and ready for occupancy in 30 working-days.



**The Austin Company**  
INDUSTRIAL BUILDERS  
Cleveland, Ohio

New York Philadelphia Pittsburgh Indianapolis  
Export the products of the American Steel Building Co. Standard Building, New York

## SAFE BEHIND RESISTAL<sup>TM</sup> AVIATOR GOOGLES



The eyes  
of the "eyes" of the Army  
must be protected.

If the Goggle you wear is not RESISTAL you  
take an unnecessary chance. RESISTAL  
cannot shatter.

On Nov. 24th, 1917, the Navy Department adopted  
RESISTAL for aviator goggles and masks.



**Strauss & Buegeleisen**  
37 Warren Street  
New York City

In addition to the Army standard frame  
RESISTAL is now made in a variety of  
frames for aviators' goggles and masks.



**Over There!**

**Skilled Workers**

**In the Air Service**

### Men of Draft Age Must Enlist Before December 13

The new selective draft regulations prevent any man from 21 to 31 years old enlisting after December 15th. In order to complete your enlistment (be examined, accepted and take the oath), you should positively report to any recruiting officer before December 15th.

## The War Will Be Won In The Air

# AEROPLANE MOTOR MECHANICS

### NOW BEING TAUGHT AT THE MICHIGAN STATE AUTO SCHOOL

A course in Aerodynamics has been established, to train mechanics for the Aviation Service. This will include thorough instruction and practice in building, turning, and repairing airplane motors, repairing of planes and other parts, features in the theory of flying, history of aviation, construction of propellers, fuselage work including metal fittings, bracing, and wiring, wing construction, controls, landing gear and pontoons and the care of the entire aircraft.

### COMPLETE EQUIPMENT

By special permission, the necessary equipment for thorough instruction has been secured from the Curtiss Aeroplane Company. A Curtiss expert will head the faculty. He is an authority on aero-motors and aeroplanes as well as hydro and flying boats. He will be assisted by a competent staff of instructors, who have had over eight years of educational training along similar lines.

### The Business of the Future

The man who becomes trained aeroplane motor mechanic now will be big man in the aeroplane business. Only a short time ago the automobile business was starting. The men who got in then are now the big men. The aeroplane business is in its infancy. The war will give it a start. The men who enter now will be big men too. The work is extremely interesting and will give its students as the business develops, airplanes and airplanes will be used for every purpose. Trained aeroplane mechanic will always be in big demand.



Trained Aero Men Serve  
Their Country Best

THE CURTISS AEROPLANE CO.  
AERODROME, WILKES-BAHAM, P.O.  
DETROIT, MICHIGAN, U.S.A.

Mr. A. C. Zeller,  
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September 27, 1917

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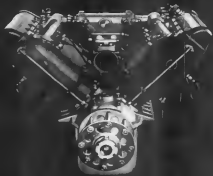
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